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ABSTRACT

This study compares an open space elementary school and a traditional school in Harford County, Maryland, in terms of cognitive and non-cognitive student outcomes. In order to assess whether there were differences in instructional climate (open vs. traditional) between the two schools, the Walberg and Thomas Teacher Questionnaire was administered to 27 teachers in the open school and 20 teachers in the traditional (control) school as an index of the teachers' opinions and practices. The results supported anticipated differences in instructional climate between the open and control schools. The subjects of the study were 127 third grade students (65 open, 62 control) and 139 fifth grade students (81 open, 58 control). The subjects were tested on achievement (the Iowa Tests of Basic Skills) and abstracts or fluid intelligence (the Cognitive Abilities Test Nonverbal Battery). Two measures of students' attitudes were also employed: (1) the Intellectual Achievement Responsibility Scale, as an index of locus of control in the classroom, and (2) the School Sentiment Index, as a measure of attitudes toward the school environment. There was no unequivocal evidence for the superiority of open education in all areas of student achievement, although fifth grade open school students did significantly better than control students in the language arts. The results of the attitudinal measures were mixed and limited by sample size, but a significant sex by environment interaction emerged at grade five. In grade five, girls at the open school were more positive in their attitudes toward school than girls at the traditional school, whereas boys were more positive in the traditional school than in the open school. Three tables summarize the results. (Author/BH)

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Assessment of Selected Outcomes of Open Education in an Elementary School

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An examination of the sizable body of literature that has accumulated on the topic suggests that few educational innovations within the past decade have generated as much public interest and discussion as open education. Yet, in spite of widespread efforts throughout the nation to implement principles and practices of open education, particularly in the elementary schools--flexibility of space and grouping, teaching teams, and individualized programs, for example--surprisingly little evidence establishing solid connections between open education practices and student outcomes has been produced.

For example, while Charbonneau (1971) found evidence of superior achievement among students in open schools, Reel (1973), Reynolds (1975), and Groobman et al (1976) found no differences in achievement. Sackett (1971), Townsend (1972), Grapko (1974), and Wright (1975), in fact, all found students in traditional schools to be performing better on standardized tests of achievement than students in open schools.

Investigations of non-cognitive outcomes have similarly produced ambiguous results. For example, Purkey et al (1970) found higher self-esteem among students attending open schools, and Traub and Weiss (1974) found a positive relationship between student self-concept and openness. However, Tuckman et al (1974) found no difference in self-concept between students attending open and traditional schools. Tuckman et al did find a more positive attitude towards school among students attending open schools, however, a finding reported also by Groobman et al and by Seefeldt and Rhoades (1976).

Recently, some researchers have turned their attention to the investigation of interactions between student traits and the learning environment, following the interest in aptitude-treatment interactions stimulated by Cronbach and Snow (1969). Aptitude-treatment interaction research is premised on the assumption that students respond differently to classroom environments because of their abilities, interests, personality traits, age, and preferred learning styles. Working within this framework, Arlin (1975) found that older elementary students tended to express more positive attitudes towards learning and teachers when they are in open classrooms; younger children, on the other hand, were more positive in traditional environments. However, the sex of the child and the subject matter being taught (arithmetic, language arts, etc.) interacted in a complex fashion with the environment to influence attitudes. Ward and Barcher (1975) found an interaction between the mental ability of students and openness in the classroom, such that highly able students had higher reading achievement in traditional environments.

Solomon and Kendall (1976) identified a number of interactions between sex, environment (categorized along numerous dimensions including open versus traditional), and affective traits. Among their findings, Solomon and Kendall noted that students with low initial reading achievement tended to gain the most in an individualized, academically-oriented environment while more proficient readers performed best in an environment characterized by orderliness and control and by varied, self-initiated activities.

The present study was initiated at the request of the teaching staff and administration of an open-space elementary school in Harford County, Maryland. They wished to examine closely both the goals and objectives for teachers and students and the actual learning environment as a means of

improving the educational program. Goals and objectives consistent with open education had been established for the school prior to its opening in 1973. At that time, emphasis had been placed upon individualization of instruction, continuous evaluation of student progress, the organization of teaching teams with common planning time, and the implementation of flexible scheduling. During the 1975-76 school year, the staff indicated a desire to re-examine the instructional practices at the school and to examine their effects upon students, with particular attention to the possibility of interactions between student traits and the instructional practices. This study then was intended to assist them in their efforts to re-examine the concept of open education, to review expectations for teacher behavior, to determine the kinds of student outcomes that logically could be expected to occur as a result of the open learning environment, and to assess the extent to which these outcomes actually were occurring.

Method

The investigator met with the faculty and administrative staff of the open school early in 1976 to review with them the school goals and procedures developed prior to the opening of the facility. Six teaching teams (one per grade level) met separately to identify goals for students, expectations for teachers, and characteristics of open learning environments. Lists were compiled and shared by the teams. The investigator reviewed the lists and developed an evaluation plan.

This plan called for the administration of a teacher survey in order to determine the extent to which the teaching practices formally identified by the staff as "open" (and expected of teachers) were seen by the teachers as characteristics of actual practice. The plan called also for the assessment

of the student outcomes determined by the faculty as desirable and logically related to open education practices. These included achievement in the basic skills, independence and a sense of responsibility, the desire to learn, and satisfactory interpersonal relationships among the students. Instruments to assess these outcomes were identified and administered as described in the following section.

Teacher attitude and student outcomes were also surveyed in a traditional elementary school identified as the control. This control school, which is operated within the same county school system, is older, less innovative, and less "open," both in terms of physical design and teaching practices. However, in addition to their geographic proximity (five miles apart), the open and traditional schools are very similar in student body size, type of community served (middle class, mixed rural/suburban), family income, student ability, rate of student transiency, size of staff, and extent of staff training and experience. The principal and instructional supervisor of the traditional school were contacted and asked to participate in the study. They agreed to do so in order to receive information about the attitude of their faculty towards the various dimensions of "openness."

Instrumentation

The survey of teaching practices was adapted from a questionnaire developed by Walberg and Thomas (1972). The survey consists of fifty statements describing specific teaching practices and beliefs that are either positively or negatively associated with open education. The respondent indicates the extent to which he/she perceives congruence between his/her own practices and beliefs and the statement.

Student achievement in vocabulary, reading comprehension, language, and

mathematics was measured by the Iowa Tests of Basic Skills (ITBS), a battery of achievement tests (Hieronymus and Lindquist, 1971). Mental ability was measured by the Cognitive Abilities Test:Nonverbal Battery (CAT), a measure of abstract or "fluid" intelligence (Thorndike and Hagen, 1971). Both instruments were administered as a part of the county-wide testing program. Students' sense of control over and responsibility for their own learning was measured by the Intellectual Achievement Responsibility Scale (IAR), developed by Crandall et al (1962). This questionnaire consists of 34 items describing school-related situations. Each situation is followed by two alternatives, one of which indicates personal responsibility for the situation. Because some of the situations described are negative and some positive, three scores are computed: IAR+, representing responsibility for positive situations; IAR-, representing responsibility for negative situations; and IAR Total, the sum of IAR+ and IAR-.

Finally, students' attitudes towards various dimensions of the school environment were assessed by the School Sentiment Index (SSI), Primary and Intermediate Forms (Instructional Objectives Exchange, 1972). The Primary Form, administered to third graders, includes 33 statements concerning school subjects, teachers, peers, and the social structure of the school. The Intermediate Form, administered to fifth graders, contains 82 items addressing basically the same dimensions of school life but including also items specifically concerned with the teacher's authority and control, the characteristics instructional mode, and the teacher's interpersonal relationships with students.

Subjects

The subjects in the study included all third graders (N=127) and fifth

graders (N=167) enrolled in the open and the traditional schools who were not excluded from the county testing program (which does exclude students in certain special education programs). At the time the evaluation was conducted, the open school was completing its third year of operation. Hence, the third graders had completed their entire elementary experience in the school they were presently attending. Fifth graders in the open school, however, had attended another elementary school for grades 1 and 2.

Data Collection

The survey of teacher openness was administered to all teachers in both schools (27 open school and 20 traditional school teachers were involved) by the investigator. The surveys were completed individually by the teachers during the course of a faculty meeting and were collected at the end of the meeting.

The ITBS and CAT were administered to all students participating in the study (in both the open and traditional schools) by their classroom teachers as a part of the county-wide testing program. The conditions for administration of these tests are standardized across the county. The IAR scale was administered to the fifth graders as a group by their classroom teachers. The forms were distributed to the students, instructions were read by the teacher, and the students completed the surveys independently during one fifty-minute class period. The IAR was administered to third graders both by regular classroom teachers and by specialists in each school, who read each item aloud to the group. The same procedures used in the administration of the IAR were followed in the administration of the SSI.

Design and Analysis

The design called for analysis of teacher responses to the survey of openness in order to determine whether teachers in the open school do perceive themselves as being more "open" in their practices than teachers in the control school. Analysis was then undertaken of the performance of the open and the control students (third and fifth graders) on the ITBS, CAT, LAR, and SSI in order to assess the effects of openness. The design called also for examination of the data for possible interactions among sex, ability, and environment at each grade level, with ITSB Vocabulary, Reading Comprehension, Language, and Mathematics test scores serving as the dependent variables. Statistical programs used in the analyses performed on the data are included in the SPSS package (Nie et al, 1975).

Results

Examination of teachers' responses to the survey of openness indicated a greater degree of conformity to principles of open education among teachers in the open school. A significant difference ($t = 2.26$, $p < .05$) between the schools' average Total scores, taken as indices of general faculty opinion and practice, supported anticipated differences between the open school and the control school in terms of instructional climate.

Analyses of covariance performed on the achievement test performance of the open and control school samples, with mental ability controlled, produced no differences attributable to openness for third graders on any of the ITBS variables. Among fifth graders, however, students attending the open school performaed significantly better in Reading Comprehension ($F_{1,164} = 7.32$, $p < .05$) and in Language ($F_{1,164} = 7.87$, $p < .05$) than pupils attending the control school, when scores were adjusted for differences

in mental ability. Vocabulary and Mathematics test scores did not differ for open and control school fifth graders.

Analysis of IAR+, IAR-, and IAR Total scores for third and fifth graders yielded no effects attributable to openness. Although sex differences were not significant for third graders, among fifth graders, girls' IAR- and IAR Total scores were higher than boys' ($F_{1,138} = 6.58$, $p < .01$, and $F_{1,138} = 3.97$, $p < .05$, respectively). (See Table 1). Interestingly, inspection of the zero-order correlations for all variables in the study indicates that among fifth graders, low but positive and statistically significant ($P < .05$) correlations between IAR Total score and achievement in Reading Comprehension, Language, and Mathematics were obtained for students attending the open school but not for students attending the control school. (See Table 2). Among third graders, correlations between IAR Total score and achievement were positive and statistically significant in both schools.

When partial correlations, removing the effects of mental ability, were computed, it was found that the correlations between IAR Total and achievement for fifth graders in the open school were no longer statistically significant. However, the partial correlations between IAR Total and achievement in Vocabulary and Reading Comprehension remained significant at the .05 level for third graders attending the open school (and at the .06 level in Language). The partial correlation between IAR Total and achievement in Mathematics remained significant at the .01 level for third graders attending the control school (see Table 3). These results seem to lend some support to a hypothesis advanced by Wright and Ducette (1976) that in an open environment, students with a strong sense of internal control and responsibility capitalize upon the opportunities for independence offered by that environment.

Analysis of SSI Total scores produced no significant main effects or interactions for third graders. However, a significant sex X environment interaction emerged at grade 5 ($F_{1,139} = 6.66$, $p < .01$). Inspection of SSI scores for fifth graders suggests that girls are more positive in their school attitude than boys. However, among girls, those attending the open school were more positive, while among boys, those attending the control school were more positive (see Figure 1). Interactions between sex and environment obtained on several SSI subtests indicate the possibility of different student responses to the social structure of the open school, on the one hand, and to opportunities for learning, on the other. However, the unestablished reliabilities of these subscales indicate that these results may at best be interpreted as suggestive.

Discussion

As a means of stimulating productive thinking among the open school staff about interrelationships among organizational climate, teaching practices, and student outcomes, the study was successful. The process of planning, implementing, and evaluating the study was found by teachers and administrators in the open school and the control school alike to be highly useful as a means of reassessing the school goals for students, the means by which those goals were being addressed, and the extent to which progress towards achievement of the goals is being realized.

The finding that there is no unequivocal evidence to support the superiority of open education in all areas of student achievement was not unexpected. The superior performance of open school fifth graders in the language arts, however, is worthy of further investigation and since several additional open space elementary schools have recently been opened in the county, plans are being made for an extension of this study to include

additional schools.

Further attention will also be given to the questions raised by the interactions between sex and environment obtained in the analysis of the school attitude data. Weaknesses in assessment procedures and in the design of the study (including a lack of external validity attributable to the narrowness of the sample) notwithstanding, the finding that boys and girls appear to respond differently to aspects of teacher behavior and of the school climate that may be related to openness is worthy of further consideration. Follow-up of these results with additional assessment of a broader sample is also planned.

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Table 1

Locus of Control[a] in an Open and a Control School:
Shown by Grade and by Sex

School	Grade	Sex	Average Score IAR+	IAR-	IAR TOTAL
Open	3	Male (N = 37)	12.49	9.41	21.90
Open	3	Female (N = 28)	12.57	9.68	22.25
Control	3	Male (N = 38)	12.39	8.21	20.60
Control	3	Female (N = 24)	12.58	8.79	21.37
Open	5	Male (N = 28)	13.18	9.61	22.79
Open	5	Female (N = 53)	13.58	11.47	25.05
Control	5	Male (N = 30)	13.50	11.00	24.50
Control	5	Female (N = 28)	13.25	11.71	24.96
Open + Control	3	Male (N = 75)	12.44	8.80	21.24
Open + Control	3	Female (N = 52)	12.57	9.27	21.84
Open + Control	5	Male (N = 58)	13.35	10.33	23.68
Open + Control	5	Female (N = 81)	13.47	11.55	25.02

[a]defined by performance on the Intellectual Achievement Responsibility (IAR) Scale; maximum IAR+ (responsibility for positive situation) and IAR- (responsibility for negative situation) score both equal 17; maximum IAR Total score = 34.

Table 2

Correlations between Locus of Control[a] and Achievement Variables[b]

School	Grade	School Achievement			
		Vocabulary	Reading	Language	Mathematics
Open	3 (N=65)	0.27*	0.26*	0.24*	0.22*
Control	3 (N=62)	0.31**	0.29*	0.27*	0.46**
Open	5 (N=81)	0.14	0.21*	0.29*	0.19*
Control	5 (N=58)	0.14	0.14	0.04	0.10

[a]defined as IAR Total score

[b]defined as ITBS subtest score

*$p < .05$

**$p < .01$

Table 3

Partial Correlations[a] between Locus of Control[b] and Achievement Variables

School	Grade	School Achievement			
		Vocabulary	Reading	Language	Mathematics
Open	3 (N=65)	0.23**	0.21*	0.20	0.17
Control	3 (N=62)	0.09	0.10	0.03	0.28*
Open	5 (N=81)	0.01	0.03	0.05	0.02
Control	5 (N=58)	0.13	0.08	0.00	0.13

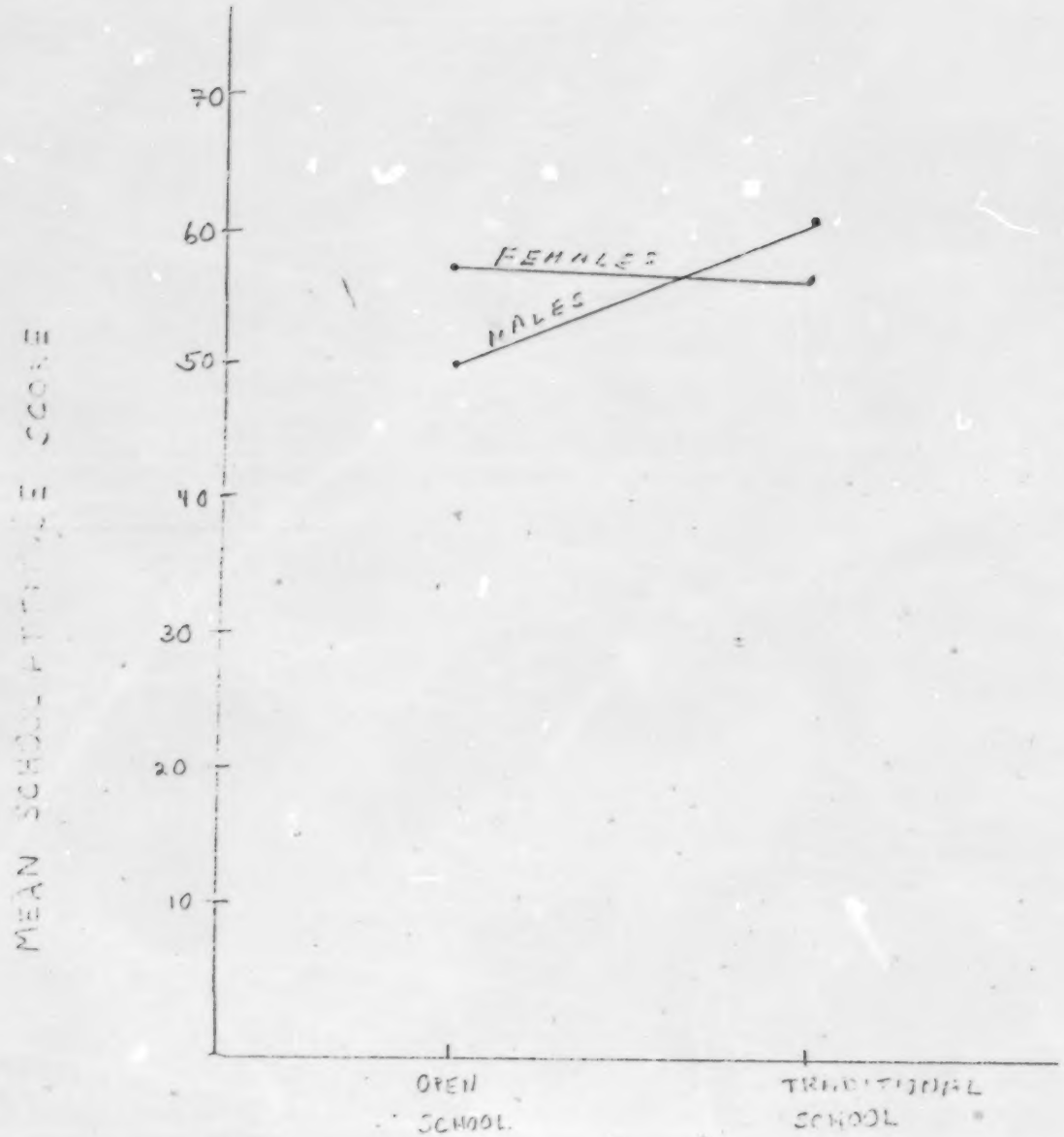
[a] removing CAT (nonverbal mental ability) score

[b] defined as IAR Total score

[c] defined as ITBS subtest score

*$p < .05$

**$p < .01$



SCHOOL ATTITUDE OF GRADE 5 MALES AND FEMALES IN AN OPEN AND A TRADITIONAL ELEMENTARY SCHOOL

FIGURE 1